Recognition and Ranking the Effective Factor on Customer Satisfaction Through Kano Model and Fuzzy AHP

*Farzaneh Radfar[1], Manouchehr Omidvari[2], Hasan Haleh[3]

[1,2,3] Department of Industrial Engineering, Islamic Azad University, Qazvin, Iran
*Far.radfar@gmail.com

Abstract: Nowadays, the ever-increasing importance of customer for the companies is clear for everyone. The governmental organizations are not exception. These organizations encounter with addressees who are fully aware of their rights and these organizations survive in replying the requests of customers and clients. Therefore, for satisfying the customers, the organizations and organs shall recognize the requests, needs and expectations of customers due to their fundamental and vital effects on the organizations so that they can reach on customers' satisfaction upon focusing and paying attention to it. This research is aimed at recognizing and prioritizing the effective indexes on citizens' satisfaction of utilities in Tabriz city of Iran, and in this regard the type of citizens' needs and requirements were recognized and classified into three main classes of Mandatory, One–dimensional and attractive having used the Kano Model and then these components were prioritized in experts' view and using FAHP technique and the importance of each of them were obtained. A questionnaire of Kano model including 20 pair questions of functional and non-functional with reliability coefficient of 0.85 was prepared and it was distributed among 400 citizens at different regions of Tabriz using the stratified sampling. The obtained results confirmed the reliability of the above model and indicated that Regular Collection of Garbage, Cleaning Streets, Lanes & Pathways, Addressing the streets' asphalt statue and Cleaning & Addressing to Canals and streams status in mandatory classification, Supplying citizens Safety and Constructing Cultural, Art, Or Sport Facilities & Spaces in One dimensional classification, Mechanizing Pedestrian Bridge with Escalator, Cleaning & Painting walls, fences in attractiveness classification are among citizens' first priority. And other needs in each class are respectively placed in next priorities.
[Radfar F, Omidvari M, Haleh H. **Recognition and Ranking the Effective Factor on Customer Satisfaction Through Kano Model and Fuzzy AHP.** *Researcher* 2014;6(3):86-94]. (ISSN: 1553-9865). http://www.sciencepub.net/researcher. 13

Keywords: Kano Model; Quality Of Service; Satisfaction; Fuzzy Sets; Fuzzy Analytical Hierarchy Process

1. Introduction

The study of management's theories and doctrines shows that after 1990s there was a tendency towards customers and increasing quality, diversity and speed of rendering of services in organization. The focus on customers, in this decade, is a concept, which has a key role in organization's sustainable competition advantage (Goli, 2007). Customer satisfaction is an essential factor in competition in global market (Chen and Chuang, 2008). As Peter Draker claimed, "customer satisfaction is the final goal of all activities". Therefore, each successful organization wants to offer services that provide customer satisfaction (Gass, 1986). There are many discussions about difference and relation between quality of services and customer satisfaction. Empirical investigations, such as Cronin and Taylor who showed that the quality of received services lead to increase customer satisfaction, confirm the cause and effect relationship between quality and satisfaction. Asprng and McCoy study also confirms this relationship (Che et al., 1999). Knowing the important factors affecting customer satisfaction has a special importance, especially in developed countries. Kano model is one of the techniques that can help to measure customer satisfaction with improvement in service quality. Kano two-dimensional quality model is an effective tool for analyzing customer needs (Lee and Huang, 2009). This model through dividing customers' needs into three categories of motivational, functional and basic needs, play a key role in management decisions in order to improve the quality of services. However, due to limited resources and time, satisfying all customers' needs cannot be done simultaneously .So necessary and important needs should be identify and priorities for action. Therefore, Analytical Hierarchy Process (AHP), which is a multi-criteria decision-making method, is used. This study categorizes and determines customers' needs and their weights in order to prioritize them by using Kano model and AHP method.

2. Literature review

In the last years of the 20th century, the issue of improving the performance of organizations and detection of customer satisfaction has always been one of the basic needs of the managerial systems and workplaces (Yuk-Lan Wong and Kanji, 2001). In an environment where the customers are knowledgeable and have the power of choice, it is not possible to neglect

their needs. Many researches showed the relationship between customer satisfaction and loyalty. These studies also found that satisfied customers are the most loyal customers (Anderson, 2001). Kenningham et al studied the existence of relationship between employee's interaction with customers and the level of customer satisfaction in retails. They stressed on the importance of this relationship (Keiningham et al., 2006). Ennew & et al addressed the problems of service quality measurement and represented a collection of indicators for measuring customers' perceptions and expectations and general customer satisfaction (Ennew et al., 1993). In another study, Stafford presented a list of bank service quality properties which perceived by customers. He also specified the main dimensions of knab service quality and examined the importance of these characteristics (Stafford, 1996). Furthermore, another study has used neural network structure in order to determine the importance of customer needs (Che et al., 1999). Johnston divides the dimensions of service quality into satisfying and dissatisfying categories, like Herzberg's motivational model, and say, that subtle aspect of communication between employees and customers has an important positive or negative impact on service quality (Johnston, 1997). Zhao & Dholakia using Kano model and multi-criteria decision models to evaluate the measurement of customer satisfaction (Zhao and Dholakia, 2009). Baki by using SERVQUAL hybrid model and Kano model logistics has measured customer satisfaction of Turkish logistics companies' services (Baki et al., 2009). Gul & Ozgen have used a hybrid model that contains of Kano, AHP and GFD models to investigate the level of customer satisfaction of Library services (Bayraktaroglu and ozgen, 2008). In Iran, Shahin & et al have used a combination of clustering and hierarchical analysis methods and Kano model for describing bank services (Kaufmann and Gupta, 1988).

3. Theoretical Framework

This section briefly defines and reviews the major methods and notations used to develop the proposed framework for logistics customer service.

3.1. Kano model

Doctor Noriaki Kano a professor in Tokyo and one of the best theorists of quality management has submitted a model, which is used in many models of customer satisfaction today. He categorized customers' needs or quality products into three groups and displayed each three types of needs in a two-dimensional graph Figure 1 Vertical axis shows customer satisfaction and horizontal axis shows the level of customers' quality requirements. The Highest and lowest point of the vertical axis of the graph respectively represent customer total satisfaction and customer dissatisfaction. The confluence of vertical and horizontal axis is the place where customer satisfaction and dissatisfaction are equilibrium. The right side of the horizontal axis shows the place, which the expected quality requirements is fully supplied and the left side display the point that the production does not contain quality requirements.

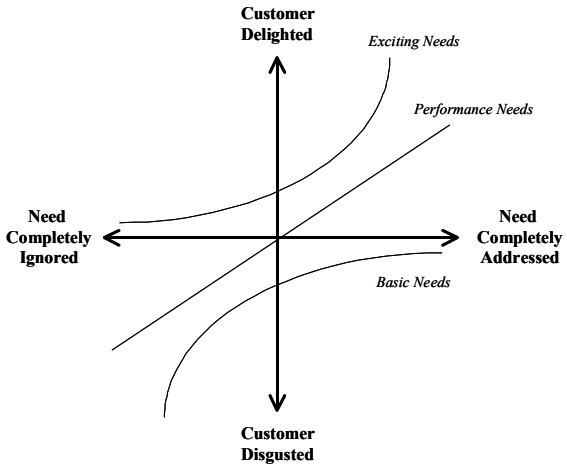

Figure 1. customers' quality requirements

Customer satisfaction was considered as one-dimensional process previously. It was considered that high quality perception of goods result in more satisfied customers and conversely. However, the fulfillment of each product features at high levels does not necessarily provide customer satisfaction. Thus, Kano customer satisfaction model introduced the methodology that determines what components of the characteristics of goods and services have influence on customers' satisfaction. In this model, customers' needs divide into three main groups:

A) Basic needs or Mandatory : If the product does not contain this need, the customer will not buy this product. This need must be contain in the product because the customer want it, although it does not lead to customer satisfaction.

B) performance or One–dimensional needs: If the product does not meet these requirements, it will result in customer dissatisfaction, but if these requirements are fulfilled, leads to customer satisfaction. Therefore, if Expected needs do not meet, the customer will not buy that product.

C) Exitement or attractive needs : A fulfilled motivational need lead to customer over satisfaction. Nevertheless, lack of this need in a product does not result in customer dissatisfaction (Vargas, 1990; Wind, Saaty, 1980). The relationship between these needs is shown in Kano figure. Of course meeting basic needs do not pass over indifference boundary and the more the performance needs are met the greater customer satisfaction happen (Wilson and Deborah, 2001).

3.2. Fuzzy Analytical Hierarchy process (FAHP)

There are many cases where we have more than one qualitative criterion for decision-making. In such a case, we may use multiple criteria decision making (MCDM) methods such as AHP to reach a fair final decision. There are literally different versions of AHP methods and the one we use is based on fuzzy concept. Although, AHP needs heavy computational process, but it is more systematic than other MCDM methods. Figure 2 shows the decision making tree in AHP inside a modified hierarchical structure. As a result, each line of hierarchical levels in AHP uses paired comparative judgments and algebraic matrix for identification and estimation of relative priorities from the criteria and options (Saaty, 1992). But AHP is not able to calculate the uncertainty in the time of problem evaluation and solution. To solve these problems, the extended model of AHP, that is, fuzzy analysis of hierarchical process (FAHP) has been suggested. This method first, transforms inaccurate and vague concepts and variable in to mathematical form and then, it prepares grounds for reasoning and decision making in uncertainty condition. FAHP using fuzzy scales with high, medium and low values resolves more efficiently the problem of ambiguous and unclear decisions (Seongkon et al., 2010).

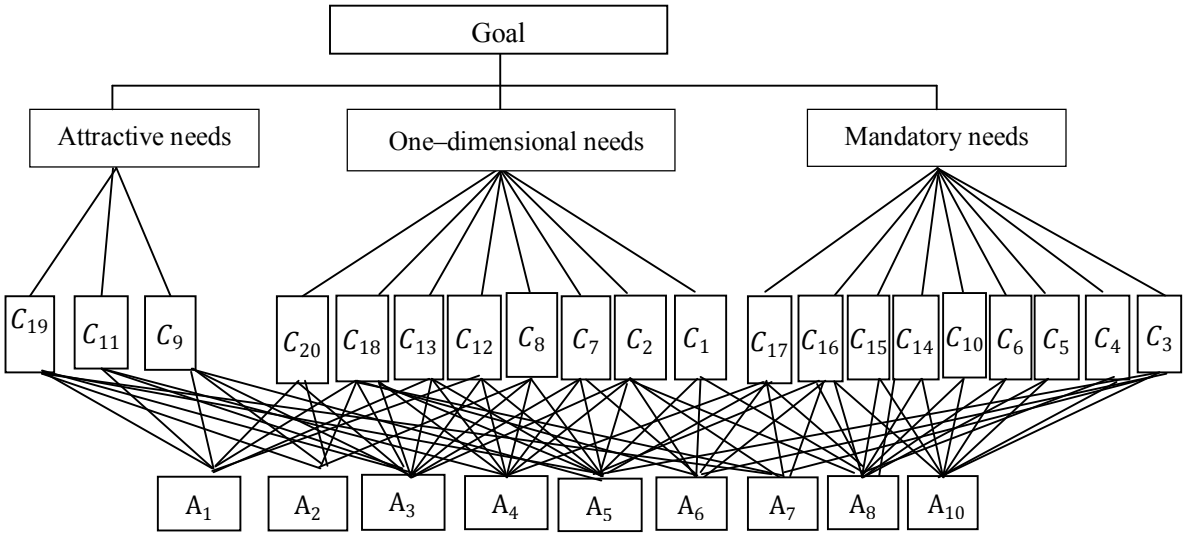

Figure 2. Hierarchical representation of decision issue

FAHP takes possession of paired comparisons of options, criteria, ambiguity and unclearness of human assessments. Table 1 shows paired comparison of fuzzyscales used.

Table 1. Trilateral fuzzy numbers

Linguistic scale	Triangular fuzzy scale
Equal important (EI)	(1 , 1 , 1)
Intermediate moderate important (IMI)	(1/2 , 1 , 3/2)
moderate important (MI)	(1 , 3/2 , 2)
Strong important (SI)	(3/2 , 2 , 5/2)
Very strong important (VSI)	(2 , 5/2 , 3)
Demonstrated importance (DI)	(5/2 , 3 , 7/2)

Source: (Tolga , et al. , 2005 ; Shahraki et al. , 2011 ; Givarian et al. , 2012)

The authors adopted Chang's extent analysis method (Chang, 1996) because the steps of this approach are relatively easier, less time taking and less computational expense than the other fuzzy AHP (Van Laarhoven & Pedrycz, 1983; Buckley, 1985; Boender et al., 1989). The steps of Chang's extent analysis methods are as follows: Let X = {x1,x2, . . . ,xn} be an object set, and U = {u1,u2, . . . ,um} be a goal set. According to the method of Chang's extent analysis, each object is taken and extent analysis
for each goal, gi, is performed, respectively. Therefore, m extent analysis values for each object can be obtained, with the following signs:

$$M^{1}_{gj},\ M^{2}_{gj},\ldots,\ M^{m}_{gj}\ ,\quad (\text{i}=1,\ldots,n).$$

Where all the M^{j}_{gj} (j=1,…,m) are TFNs.

The steps of Chang's extent analysis can be given as in the following:

Step 1- the value of fuzzy synthetic extent with respect to ith object is defined as:

$$S_i = \sum_{j=1}^{m} M^{j}_{gj} \otimes \left[\sum_{i=1}^{n} \sum_{j=1}^{m} M^{j}_{gi} \right]^{-1} \qquad (1)$$

To obtain $\sum_{j=1}^{m} M^{j}{}_{gi}$, perform the fuzzy addition operation of m extent analysis values for a particular matrix such that $\sum_{j=1}^{m} M^{j}{}_{gi} = (\sum_{j=1}^{m} l_i , \sum_{j=1}^{m} m_i , \sum_{j=1}^{m} u_i)$

And to obtain $\left[\sum_{i=1}^{n}\sum_{j=1}^{m} M^{j}{}_{gi}\right]^{-1}$ in relation (1), perform the fuzzy addition operation of $M^{j}{}_{gi}$ (j=1,…,m) values such that Eq. (2):

$$\sum_{i=1}^{n}\sum_{j=1}^{m} M^{j}{}_{gi} = (\sum_{i=1}^{n} l_i , \sum_{i=1}^{n} m_i , \sum_{i=1}^{n} u_i) \qquad (2)$$

And then compute the inverse of the vector in Eq. (2) such that:

$$\left[\sum_{i=1}^{n}\sum_{j=1}^{m} M^{j}{}_{gi}\right]^{-1} = (\frac{1}{\sum_{i=1}^{n} u_i}, \frac{1}{\sum_{i=1}^{n} m_i}, \frac{1}{\sum_{i=1}^{n} l_i}) \qquad (3)$$

Step 2- The degree of possibility of $M_2 = (l_2, m_2, u_2) > M_1 = (l_1, m_1, u_1)$ is defined as $V(M_2 \geq M_1)$:

$$\begin{cases} V(M_2 \geq M_1) = 1 & if\ m_2 \geq m_1 \\ V(M_2 \geq M_1) = hgt(M_1 \cap M_2) & otherwise \end{cases} \qquad (4)$$

,

$$hgt(M_1 \cap M_2) = \frac{l_1 - u_2}{(m_2 - u_2) + (m_1 - l_1)}$$

Where d is the ordinate of highest intersection point D between μ_{M_1} and μ_{M_2} (see Figure 3.)

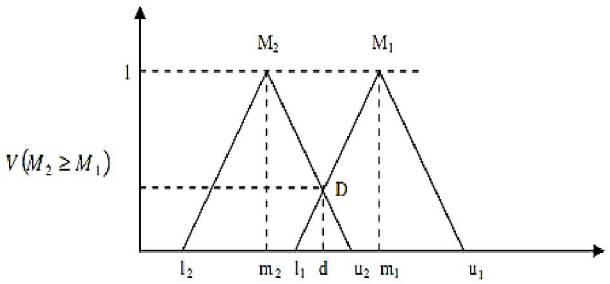

Figure 3. The intersection between M1 and M2 (Chang, 1996)

Step 3- The degree of possibility for a convex fuzzy number to be greater than k convex fuzzy numbers $M_i (i = 1,...,k)$ can be defined by:

$V(M_1 \geq M_2,...,M_K) = V(M_1 \geq M_2),...,V(M_1 \geq M_K)$

$= \min V(M \geq M_i)$, $i = 1,...,k$ (5)

Assume that

$d'(A_i) = \min V(S_i \geq S_K)$ (6) For $k = 1, 2, \ldots, n; k \neq i$. Then the weight vector is given by:

$$W' = (d'(A_1), d'(A_2),..., d'(A_n))^T \qquad (7)$$

Where $A_i (i = 1,...,n)$ are n elements.

Step 4- Via normalization, the normalized weight vectors are

$$W = (d(A_1), d(A_2),..., d(A_n))^T \qquad (8)$$

where W is a non-fuzzy number.

4. Methodology

There are different stages for the proposed model of this paper. In the first stage, we interviewed some experts to find the most important issues affecting citizens' satisfaction. In this stage, we also interviewed experts and connoisseurs for preparing the necessary Indicators. The questionnaire has included 20 questions (Functional and dysfunctional questions) about citizens' needs quality of services the municipality regions in Tabriz. The questions of this questionnaire have been divided into three groups of Mandatory, One–dimensional and attractive using the Kano table. Next, we have used FAHP to prioritize different alternatives.

The proposed model of this paper, We have used the following sampling procedure to find out where the number of questionnaire is sufficient or not.

$$n = \frac{\frac{{Z_{\alpha/2}}^2 pq}{d^2}}{1 + \frac{1}{N}(\frac{{Z_{\alpha/2}}^2 pq}{d^2} - 1)} \qquad (9)$$

Where N is the population size, p=1-q represents the yes/no categories, $Z_{\alpha/2}$ is CDF of normal distribution and finally d is the error term. Since we have p=0.5 , $Z_{\alpha/2} = 1.96$ and d=0.05.

We obtained Sample Sizes:400 for All Populations, also calculated Sample Size using the stratified sampling for each region in Tabriz .

Finally, We distributed questionnaires .The following results in table 2, show Personal characteristics of the people participating in the survey.

Table 2. General information of respondents.

Gender	Man: 251
	Woman: 149
marital status	Single: 169
	Married: 231
Age	18-30 years: 141
	31-40: 136
	41-50: 66

	51-60: 46
	61 years and higher: 11
Education	High school diploma and lower: 95
	Junior college diploma: 85
	Bachelor degree: 148
	M.Sc. and M.A. and higher: 72

To identify the affected factors on citizens' satisfaction, by using library resources, essays, books, related thesis and web network, and also views of experts, 20 factors are identified.

Questionnaires with the Kano model is made and distributed among citizens and collected the related information.

In table 3, determining is shown according to Kano model (Berger et al, 1993).

After collecting questionnaires in the first and second part of research, by using statistical sample, affected factors on citizens satisfaction, accordance to three Kano needs, it means, Mandatory, One-dimensional and attractive are divided in table 4.

Table 3. Kano evaluation matrix

CRs			How do you feel if requirement X is not present?				
			DYSFUNCTIONAL Question				
			1.like	2.must-be	3.neutral	4.live with	5.dislike
How do you feel if requirement X is present?	FUNCTIONAL Question	1.like	Q	A	A	A	O
		2.must-be	R	I	I	I	M
		3.neutral	R	I	I	I	M
		4.live with	R	I	I	I	M
		5.dislike	R	R	R	R	Q
	A=Attractive O=One-dimensional			M=Must-be I=Indifferent		R=Reverse Q=Questionable	

Source: Adapted from Kano et al. (1984)

Table 4. Kano questionnaire results

Service Attributes (Factors)	Responses frequency Percent						
	M	O	A	I	Q	R	Most of
Addressing the Façade of City	%28	%54	%11.75	%5.5	%0.75		O
Feedback & involving citizens' opinions	%33.25	%38.75	%16.5	%11	%0.5		O
Authorities' Speed & Seriousness in Addressing the citizens' Problems	%53	%33.75	%5.5	%7.75			M
Proper & Appropriate Encountering of Municipality Employees with the Referred	%49.25	%37	%8.25	%5.25	%0.25		M
Regular Collection of Garbage	%59	%31.5	%3.5	%6			M
Cleaning streets, lanes & pathways	%46.5	%43.75	%8.75	%1			M
Keeping & developing public green spaces & parks	%29.25	%48.5	%13.5	%8.75			O
Supplying citizens Safety via mounting fence, air bridge, Pedestrian Lining, Speed Bump, etc.	%25.75	%33.75	%23.75	%16.75			O
Mechanizing Pedestrian Bridge with Escalator	%19.5	%29.5	%34.5	%16.25		%0.25	A
Cleaning & Addressing to Canals and streams status	%63.25	%28	%3.5	%5.25			M
Service Attributes (Factors)	Responses frequency Percent						
	M	O	A	I	Q	R	Most of

Cleaning & Painting walls, fences and Tables	%28.25	%28	%30.25	%13.5			A
Addressing the Eliminating the Nuisance of annoying jobs, Peddlers, Beggars, and other Bothers Factors of citizens	%26.5	%39.25	%9.25	%22.75	%1.5	%0.75	O
Pruning trees & Their Spraying in streets and parks	%35.25	%40.5	%15.75	%8.25		%0.25	O
Addressing the environmental health and fighting with insects, vermin and stray animals	%61	%32.25	%4.75	%2			M
Addressing the Sidewalk floorings	%60	%29.5	%5.75	%4.75			M
Addressing the streets' asphalt statue	%72.25	%21.25	%2.75	%3.75			M
Addressing public restrooms and increasing them in city	%57	%27.25	%5.25	%10.5			M
Constructing Cultural, Art, Or Sport Facilities & Spaces (constructing library, cultural center, sport saloon and ground)	%24.25	%35.75	%27.5	%12.5			O
Holding ceremonies and matches in national, religious events, landscaping and city decoration in feasts and mourning	%23.75	%27	%34.75	%13.5	%0.25	%0.75	A
Serious and Vigorous Encountering with Unauthorized Construction and Addressing to Urban Constructions	%38	%44.25	%6.25	%11.25	%0.25		O

On the other hand, in order to determine the weight of each criterion with AHP, the factors were divided into 3 categories and the hierarchical decision tree was shown in Figure 2. In the next part of research, the results of comparing and paired questionnaire were collected and calculated.

An important point, here is that the questionnaires in this part were distributed among only 5 experts as the decision makers for assessing satisfaction and aggregated with Geometric mean. the results of criterion priorities is giving in table 5.

Table 5. FAHP results for major criteria

	Mandatory needs	**One – dimensional**	**Attractive**	**WFAHP**
Mandatory needs	(1, 1, 1)	(0.944, 1.351, 1.719)	(1.760, 2.268, 2.773)	0.5991
One – dimensional	(0.582, 0.740, 1.059)	(1, 1, 1)	(0.871, 1.383, 1.888)	0.3306
Attractive	(0.361, 0.441, 0.568)	(0.530, 0.723, 1.149)	(1, 1, 1)	0.0704

The consistency ratio for the information given in Table 5 is about 0.02, which confirms the results of our survey at this level. There are different factors for each criteria compared with FAHP method. Mentioned priority weights have shown for each criterion in Table 6.

The FAHP analysis of the criteria is summarized in Figure 4.

Tables 6. Priority weights for each criterion

	The order of the Kano Model Benchmarks	Weight in group (Local weights)	Total weight by FAHP (Global weights)	Ranking
Basic need (M)	C3: Authorities' speed & seriousness in addressing the citizens' problems	0.0457	0.0274	15
	C4: Proper & appropriate encountering of municipality employees with the referred	0.0455	0.0273	16
	C5: Regular collection of garbage	0.2414	0.1446	1
	C6: Cleaning streets, lanes & pathways	0.1796	0.1076	2
	C10: Cleaning & Addressing to canals and streams status	0.1403	0.0841	4
	C14: Addressing the environmental health and fighting with insects, vermin and stray animals	0.0626	0.0375	11
	C15: Addressing the sidewalk floorings	0.0791	0.0474	9
	C16: Addressing the streets' asphalt statue	0.1590	0.0952	3
	C17: Addressing public restrooms and increasing them in city	0.0468	0.0280	14
Total weight of Basic needs group		0.5991		
Expected neesds (O)	C1: Addressing the façade of city	0.0884	0.0292	13
	C2: Feedback & involving customers' opinions	0.0120	0.0040	19
	C7: keeping & developing public green spaces & parks	0.1616	0.0534	7
	C8: Supplying citizens safety via mounting fence, air bridge, pedestrian lining, speed bump, etc	0.2419	0.0800	5
	C12: Addressing the eliminating the nuisance of annoying jobs, peddlers, beggars, and other bothers factors of citizens	0.0606	0.0200	18
	C13: Pruning trees & their spraying in streets and parks	0.0778	0.0257	17
	C18: Constructing cultural, art, or sport facilities & spaces (constructing library, cultural center, sport saloon and ground)	0.2066	0.0683	6
	C20: Serious and vigorous encountering with unauthorized construction and addressing to urban constructions	0.1510	0.0499	8
Total weight of Expected needs group		0.3305		
Excitement (A)	C9: Mechanizing pedestrian bridge with escalator	0.4373	0.0308	12
	C11: Cleaning & Painting walls, fences and tables	0.5627	0.0396	10
	C19: Holding ceremonies and matches in national, religious events, landscaping and city decoration in feasts and mourning	0.0000	0.0000	20
Total weight of Excitement needs group		0.0704		

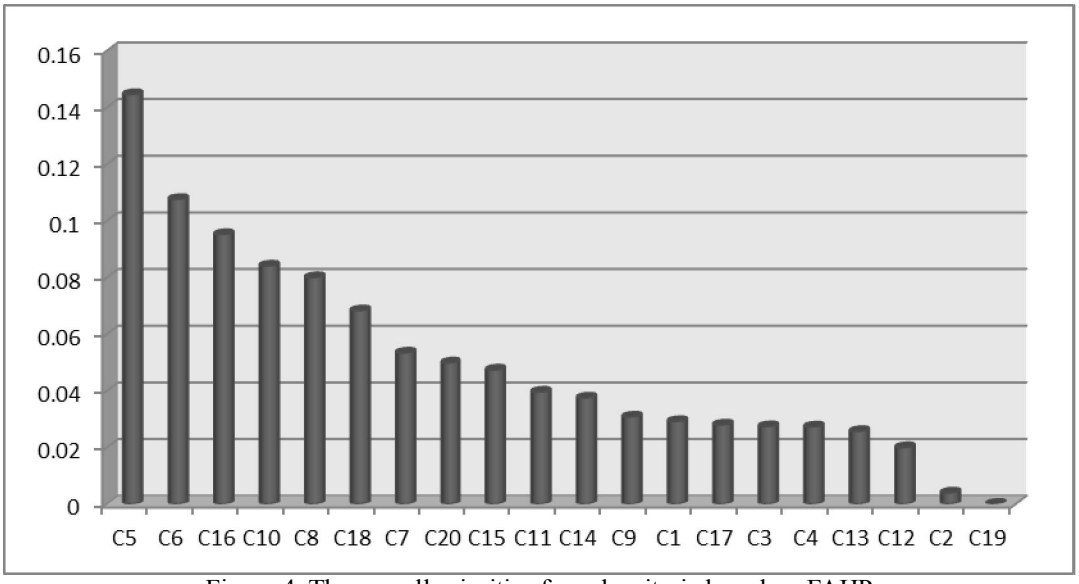

Figure 4. The overall priorities for sub-criteria based on FAHP

3. Conclusion and discussion

In this paper, we have presented an empirical survey to study the most important issues affecting customer satisfaction. The proposed model of this paper used a combination of Kano method and fuzzy analytical hierarchy process. First, using Kano's model all citizens' needs were divided into three groups of Mandatory, One–dimensional and Attractive. Next, using Fuzzy hierarchical analysis technique each requirement for prioritization was identified in each class. After specification of the existing priority in each class, final ranking and of citizens' requirements was determined and was obtained.

Analyzing data collected by distributing questionnaires using kano model, it is resulted that these factors effect on customer satisfaction:

Rapport among 20 studied factor C3, C4, C5, C6, C10, C14, C15, C16 and C17 are as Mandatory needs. Also, these factors function as One–dimensional factors: C1, C2, C7, C8, C12, C13, C18 and C20. And C9, C11 and C19 are as Attractive factors.

Also, according to AHP results effective and principle effects on citizens'satisfaction are:

1- Regular Collection of Garbage factor weighing 0.1446 in the first place of effective factors. And this factor weighing 0.2414 has been determined as most important effective Mandatory factor a many all on, citizens'satisfaction. 2- Cleaning Streets, Lanes & Pathways factor weighing 0.1076 rank second. 3- Addressing the streets' asphalt statue factor weighing 0.0952 is of third rank of importance. 4- Cleaning & Addressing to Canals and streams status factor, weighing 0.085 rank fourth. 5- Supplying citizens Safety factor weighing 0.08 rank fifth and this factor has been determined as most important effective One–dimensional factor.

In addition, it was found that most of the services from citizens' point of view which were placed in class of Mandatory requirements, in experts' view are of a higher priority.

This study helps municipalites to concern more important effective factors to raise citizens satisfaction and allocate organization resources accurately on this basic.In addition, in this paper a kano model in crisp mood was presented for recognizing and classifying effective indexes on customers' satisfaction. To have more mode for classifying customers' requirements, a kano model in fuzzy mood can be considered as further researches.

Correspondence to:
Farzaneh Radfar,
Department of Industrial Engineering, Islamic Azad University, Qazvin, Iran.
Email: f.radfar@qiau.ac.ir; Far.radfar@gmail.com
submission date: 3/23/2014

References

1. Anderson MK. The relationship between customer satisfaction ,customer loyalty and Customer profitability. School of economic and management university of Arhus,Denmark 2001.
2. Baki B, Basfirinci CS, Cilingir Z, Murat AR . An application of integrating SERVQUAL and Kano's model into QFD for logistics services: A case study from Turkey. Asia Pacific Journal of Marketing and Logistics 2009; 21(1):106-126.

3. Bayraktaroglu, Ozgen. Integrating the Kano model, AHP and planning matrix QFD application in library services. library Management 2008; 29(4/5):327-351.
4. Che A, Lin ZH, Chen K. Capturing Weight of voice of the customer using artificial neural network in quality function deployment. Journal of Jiaotong University 1999; 5(5).
5. Chen C, Chuang M. Integrating the Kano model into a robust design approach to enhance customer satisfaction with product design. International Journal of Production Economics 2008; 114(2):667-681.
6. Ennew C, Reed G, Binks M. Importance performance analysis and the measurement of SQ. European journal of marketing 1993; 27(2):59-70.
7. Gass SI. A Process for Determining Priorities and Weights for Large Scale Linear Goal Programmes. Journal of Operations Research Society 1986; 37(8).
8. Givarian H, Gholizadeh Baiee M, Pournasr Khakbaz P. Designing System Of Ranking Voice Of Customer In The Municipalities Of Tehran. South Asian Academic Research Journal S 2012; 2(3).
9. Goli A. Principles of Marketing service institutions. payegan publish 2007.
10. Johnston R. Determinants of SQ: satisfier and dissatisfiers. international journal of Service Industry Management 1997; 6(5):53-71.
11. Kaufmann A, Gupta M. Fuzzy Mathematical Models in Engineering and Management Science. Elsevier Science Inc.New York, NY, 1988.
12. Keiningham TL, Aksoy L, Cooil B, Peterson K, Vavra TG. A longitudinal examination of the asymmetric impact of employee and customer satisfaction on retail sales. Managing Service Quality 2006; 16(5):442-459.
13. Lee YC & Huang SY. A new fuzzy concept approach for Kano's model. Expert Systems with Applications 2009; 36(3, Part1):4479-4484.
14. Noriaki K, Seraku N, Takahashi F, Tsuji Sh. Attractive quality and must-be quality. Journal of the Japanese Society for Quality Control (in Japanese) 1984; 14(2): 39–48.
15. Saaty TL. How to make a decision: The analytic hierarchy process. Eur. J. Oper. Res 1992; 48:9-26.
16. Seong KGM, Sang KL, Hui KS, Jongwook K. Econometric analysis of the R&D performance in the national hydrogen energy technology development for measuring relative efficiency : The fuzzy AHP/DEA integrated model. Approach Int. J. Hydrogen Energy 2010; 35: 2236-2246.
17. Shahraki A, Jamali Paghaleh M. Ranking The Voice Of Customer With Fuzzy Dematel And Fuzzy AHP. Indian Journal Of Science And Technology 2011; 4(12).
18. Stafford M. Demographic discriminators of SQ in the banking industry.journal of service marketing 1996; 10(4):6-22.
19. Tolga E, Levent Demircan M, Kahraman C. Operating system selection using fuzzy replacement analysis and analytic hierarchy process. Int. J. Production Economics 2005; 97:89–117.
20. Vargas LG, Europpean Journal of Operation Research 1990; Vol. 48., Wind Y, Saaty TL. Marketing Applications of the AHP Management. Science 1980; 26(7).
21. Wilson M, Deborah. Making The Grade For Service Safety. Wireless Week 2001; 7(19).
22. Yuk-Lan Wong W, Kanji GK. Measuring customer satisfaction: Evidence from Hong Kong retail banking industry. Total Quality Management 2001; 12(7-8):939-948.
23. Zhao M, Dholakia R. A multi-attribute Model of web site interactivity and customer satisfaction: An Application of the Kano model. Managing Service Quality 2009; 19(3).

3/23/2014